

REVIEW OF THE NEW WORLD LACE BUG GENERA
ACANTHOCHEILA STÅL AND *CARVALHOTINGIS* NEW GENUS
(HETEROPTERA: TINGIDAE)

RICHARD C. FROESCHNER

Department of Entomology, National Museum of Natural History, Washington, D.C.
20560.

Abstract.—*Acanthocheila* Stål is revised and redefined with removal of the new genus *Carvalhotingis*. Of the 16 species formerly cataloged in *Acanthocheila*, 8 are retained but reduced to 7 with 1 new synonymy: *A. abducta* White, *A. armigera* Stål (= *A. nigrescens* Drake and Bondar), *A. dira* Drake and Hambleton, *A. exquisita* Uhler, *A. sigillata* Drake and Bruner, *A. spinicosta* Van Duzee, and *A. thaumana* Drake and Cobben. The other 8 species are transferred to *Carvalhotingis* and reduced to 5 with the following new combinations and new synonymies: *C. comitis* Drake, *C. hollandi* Drake (= *comentis* Drake, = *denieri* Monte, = *rustica plana* Drake, = *rustica rustica* Monte), *C. nexa* Drake, *C. tumida* Drake, and *C. visenda* Drake and Hambleton. Keys to the 2 genera and their species are included.

Key Words: Heteroptera, Tingidae, New World, new genus, new species, new synonymies, key

In honor of the memory of a long time friend and colleague—José Candido de Melo Carvalho—and in recognition of his many fine contributions to the study of biology, the following new genus, *Carvalhotingis*, is named after him.

My attempts to divide the currently cataloged lace bug tribe Tingini into groups of genera based on external characters revealed that some of the accepted genera are actually composite, encompassing more than one genus. The present paper deals with one of them by dividing *Acanthocheila* Stål into two genera.

The genus *Acanthocheila* was cataloged by Drake and Ruhoff (1965) with sixteen species and one “variety”; the distributions given below are mostly from that catalog, but include subsequently encountered country records indicated by an asterisk.

Until now *Acanthocheila* was recognized among American tingid genera by the combination of the uniseriate paranotum whose free margin bears a row of long (almost as long as or longer than width of an eye), stout spines, plus the costal margins being parallel for a short distance from the base and thence widened.

However, my studies of other structures showed this definition included two genera: the second is here described as a new genus *Carvalhotingis*. Initially this separation was suggested by the presence or absence of occipital spines (Figs. 1, 2); then additional contrasting characters were found. The two genera show different structure of the subantennal plate on the side of the head: in *Carvalhotingis* (Fig. 4) that plate is a simple, narrow strip passing vertically next to the eye and not approaching the side of the head:

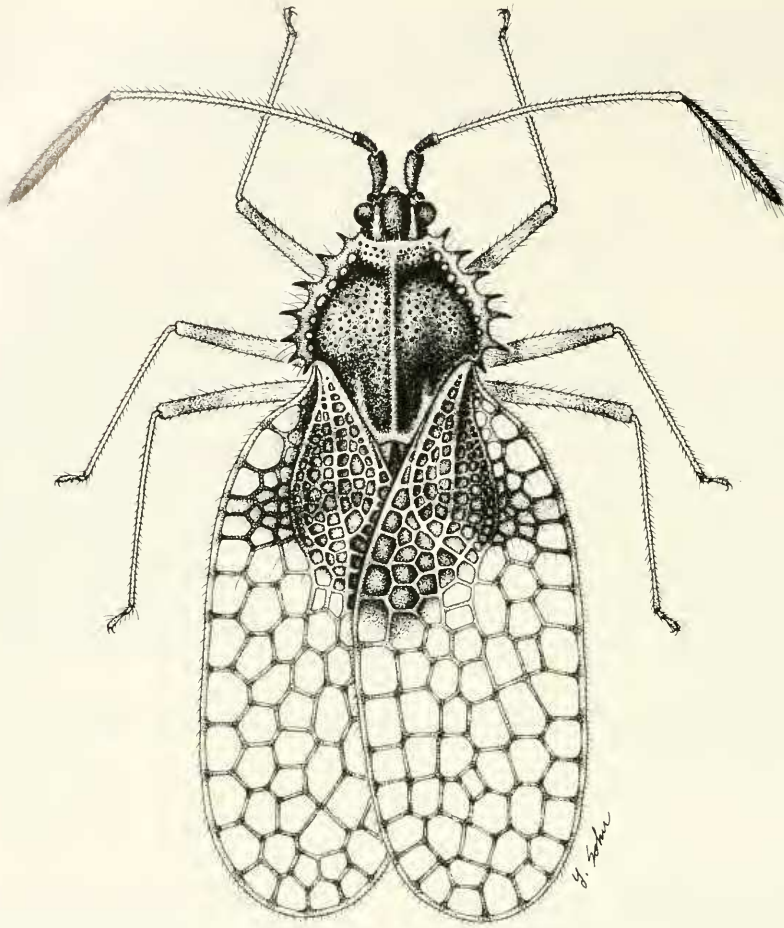


Fig. 1. *Acanthocheila armigera* (Stål). Natural length 3.7 mm.

in *Carvalhotingis* (Fig. 4) that plate is a simple, narrow strip passing vertically next to the eye and not approaching the margin of the clypeus, while in *Acanthocheila* (Fig. 3) that plate has its anterior margin convexly expanded forward to almost or quite reach the margin of the clypeus. Modifications of the bucculae further support the separation: all species of *Acanthocheila* have the anterior ends of the bucculae incurved anterior to the clypeus and, except in *A. sigillata* Drake and Bondar, in contact with each other beyond the clypeus (Fig. 3). In *A. sigillata* the anterior ends of the bucculae are distinctly incurved anterior to the clypeus but

they do not meet; in contrast, the bucculae in *Carvalhotingis* are parallel and do not reach the apex of the clypeus (Fig. 4).

In both genera there were serious problems in defining and separating certain of the described species—hence, it was necessary to synonymize several of them.

These two genera may be conveniently separated by the following couplet:

Head with prominent occipital spines. Bucculae strongly incurved beyond apex of clypeus
 *Acanthocheila* Stål
 Head without occipital spines (Caution: the long hairs may sometimes be matted in groups and look

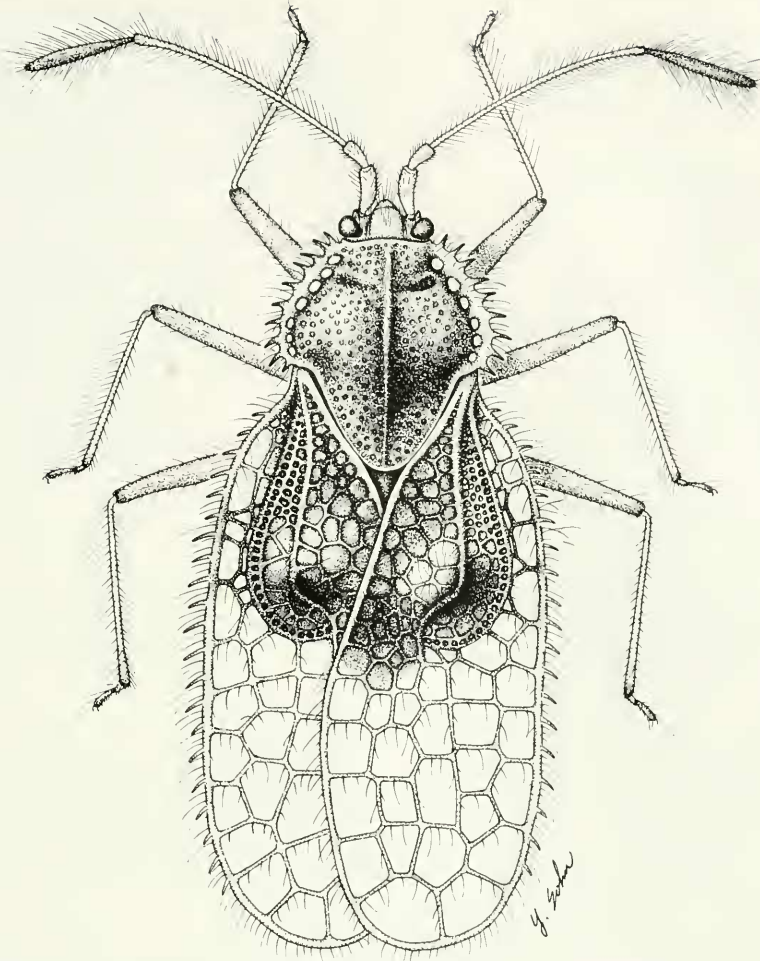


Fig. 2. *Carvalhotingis tumida* (Drake). Natural length 4.0 mm.

like spines). Bucculae parallel, not incurved anteriorly *Carvalhotingis*, new genus

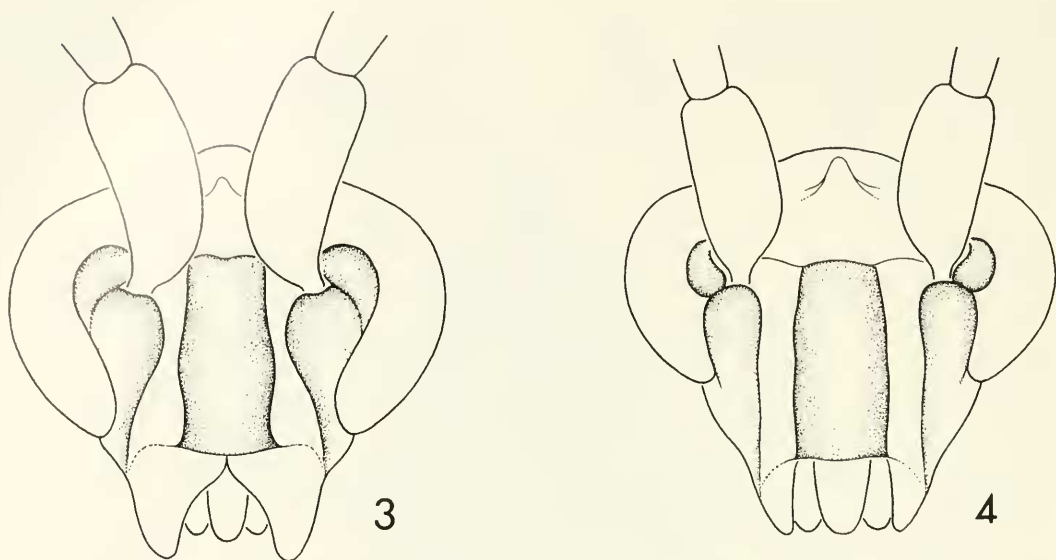
Genus *Acanthocheila* Stål
(Figs. 1, 3, 5)

Monanthia (*Acanthocheila*) Stål, 1858: 61.
Type-species:—*Monanthia* (*Monanthia*)
Stål, designated by Van Duzee, 1916: 26.
Acanthochila [sic].—Stål, 1872: 127.

Diagnosis.—As defined and keyed above.
Characters.—Length, 2.4–5.0 mm. Dorsal surface with few fine hairs or none. Macropterous; hemelytral axes subparallel to

diverging, apices moderately to strongly separated.

Head.—Short, with 2–3 cephalic spines: occipital spines elongate, each reaching at least to base of antennal tubercle; with or without anteromedian spine or tubercle; supraclypeals always absent. Eyes a little less to slightly more than half as wide as interocular space. Bucculae anteriorly surpassing, incurved, and, except in *A. sigillata*, contiguous beyond apex of clypeus. Labium nearly or quite reaching meso-metasternal suture. Antennal segment I three-fourths to subequal to interocular width, almost twice



Figs. 3, 4. 3. *Acanthocheila armigera*. Anterior view of head showing bucculae incurved and contiguous anterior to clypeus, and convex anterior margin of subantennal plate. 4. *Carvalhotingis tumida*. Anterior view of head showing widely separated bucculae, and straight anterior margin of subantennal plate.

as long as II, III thinnest. Subantennal plate convex anteriorly, nearly or quite reaching margin of clypeus (Fig. 3).

Pronotum.—Without cysts; median carinae low, reaching transverse anterior margin of pronotum, virtually without cells. Lateral carinae absent or represented by weak to vague calloused lines on posterior projection. Paranotum narrow to moderately broad, uniseriate, with marginal row of 5–10 long, stout, tapering spines. Posterior pronotal projection extending to basal third or midlength of discoidal area, acutely triangular, converging to a broadly truncated or distinctly emarginate apex.

Hemelytron.—Except for oblique basal part of costal area, nearly flat. Discoidal area, except at apex, distinctly separated from sutural area; with 2–5 cells across widest part. Subcostal area faintly convex, horizontal, with 2–6 rows of cells, outermost row of cells sometimes narrowed and delimited by thickened veins. Costal margin convex to concave on basal fourth; margin with 0–3 small spines on basal seventh, or with a row

of distinct spines extending from base to beyond apex of discoidal area. Costal area with 1–3 rows of cells. Hypocosta uniseriate and distinct for only a short distance at base, becoming obsolete before midlength of abdomen.

Peritreme variable, elevated and transversely auriculate to obsolete. Metapleural flange a narrow, transverse, single row of cells. Sternal laminae present on all three sterna; on prosternum parallel, on mesosternum distinct to very weak, widely separated near base, ventral margin with or without a premedian, distinct angulation; on metasternum low but distinct, outwardly convex, apically more or less approaching each other. Abdomen basoventrally convex.

Type species.—*Monanthia (Acanthocheila) armigera* Stål, designated by Van Duzee 1916: 26.

Known geographic distribution.—The known range of this essentially Neotropical genus is from Argentina north through South and Central America, and the West Indies

to southern Texas and the southern tip of Florida.

Comments.—All species of the genus as here constituted, except *A. abducta* White (*A. dira* Drake and Hambleton known only from female holotype), show some sexual dimorphism in the subcostal area: Females have it noticeably wider than it is in the males and usually have one or more additional rows of cells; females are darker and more strongly marked than males.

Other variations in range of color of individuals are also evident. The pronotum may vary from yellowish tan to virtually black. The hemelytra may vary from virtually colorless, with a few parts of veins lightly embrowned, to having most of the cells in the discoidal and subtending subcostal areas dark brown. In the latter case the brown color extends almost or quite to the costa as a broad band across the basal third of the costal area. Within the band crossing the costal area the cells are usually much reduced in size and form more rows than are evident basal to or beyond the band. The first two antennal segments may be deep black, brown, or pale yellow; accompanying this, the apical two thirds of each femur may be decidedly darkened.

The presence (Fig. 5) or absence of the premedian angulation on the lower margin of the mesosternal lamina is especially interesting when correlated with the distribution of the several species. All but one of those species with such an angulation are continental forms from South and Central America, including *A. armigera*, which ranges north into the southern United States and onto the Antilles. Those species without such an angulation appear restricted to the Bahamas and the West Indies, including *A. exquisita* Uhler which was described from Key West, Florida (perhaps it was an introduction there), but subsequently found to inhabit the Bahamas. The exception to the above generalizations is the more recently described *A. thaumana* Drake and Cobben which does have such an angulation but ap-

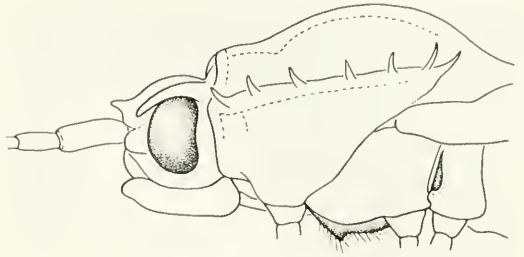


Fig. 5. *Acanthocheila armigera*. Lateral view showing small angulation on mesosternal carina.

pears restricted to the Leeward Islands of St. Eustatius and St. Martin.

The specimens that run to *armigera* in the following key to species vary in several and perplexing ways. This variability was recognized and, in part, described by Champion (1897: 28) and some subsequent authors. Several of these variations may be present or absent in a series with identical label data or may be found in different combinations, sometimes on the two sides of the same specimen. At this time the significance of these variations is not evident. But recognition of them as simply "variations," leads to the conclusion that *A. armigera* must be the senior synonym of *A. nigrescens* Drake and Bondar, new synonymy; further study may prove otherwise.

It might be helpful to comment on some of these variations. The paranotum may terminate at the anterior margin of the collar or conspicuously project cephalad; its 7–11 marginal spines may be equally spaced or variously separated. Most specimens with the simple row of spines on the margin of the paranotum also have the head showing a distinct angulation or a small but evident spine anterodorsally (best seen in profile); in contrast, those specimens with the anterior 2–3 paranotal spines crowded together usually have the anterodorsal outline of the head (in profile) smoothly decurved, but sometimes they show a distinct angulation. These combinations of differences may be evident on specimens in a series bearing the same label data, or the paranotal spine num-

ber and arrangement may differ on the two sides of one individual. None of these patterns show any association with geography.

The lateral discal carinae may be absent, or may show a trace of the posterior ends as a vaguely calloused longitudinal ridge projecting anteriorly from the lateral margin of the pronotum's posterior projection (Fig. 1).

These variations do not appear to be sufficiently constant and contrasting to use for separating *A. armigera* into two or more species.

LIST OF ACANTHOCEILA SPECIES

- Acanthocheila abducta* White
- Acanthocheila abducta* White, 1879: 485.
- Acanthocheila kahavalu* Kirkaldy, 1905: 216. Synonymized by Drake and Ruhoff, 1965: 56.
- Known distribution: Bolivia, Brazil, Peru.
- Acanthocheila armigera* (Stål)
- Monanthia (Acanthocheila) armigera* Stål, 1858: 61.
- Monanthia (Acanthocephala) spinuligera* Stål, 1858: 61. Synonymized by Monte, 1938: 128.
- Acanthochila (sic) armigera*. — Stål, 1873: 127.
- Acanthocheila nigrescens* Drake and Bondar, 1932: 88. NEW SYNONYMY.
- Known distribution: Argentina, Bolivia, Brazil, Colombia, Costa Rica*, Cuba, Ecuador, El Salvador*, Guatemala, Haiti, Honduras, Jamaica, Mexico, Panama, Peru, Puerto Rico, Trinidad, Venezuela, United States of America.
- Acanthocheila dira* Drake and Hambleton
- Acanthocheila dira* Drake and Hambleton, 1945: 359.
- Known distribution: Guatemala
- Acanthocheila exquisita* Uhler
- Acanthocheila exquisita* Uhler, 1889: 143.
- Known distribution: Bahamas. United States of America.
- Acanthocheila sigillata* Drake and Bruner

Acanthocheila sigillata Drake and Bruner, 1924: 147.

Known distribution: Cuba.

Acanthocheila spinicosta Van Duzee

Acanthocheila spinicosta Van Duzee, 1907: 20.

Known distribution: Dominican Republic, Haiti, Jamaica, Puerto Rico, St. Thomas (Virgin Islands).

Acanthocheila thaumana Drake and Cobben

Acanthocheila thaumanni Drake and Cobben, 1960: 71.

Known distribution: St. Eustatius, St. Martin (Virgin Islands).

KEY TO SPECIES OF ACANTHOCEILA

- 1. Costa with a series of strong spines reaching to or beyond apex of discoidal area 2
- Costal area with no spines or with 1–3 confined to basal seventh 4
- 2. Midline of head with tubercle or a strong, projecting, tapering spine above base of clypeus 3
- Midline of head with no tubercle or spine *exquisita*
- 3. Cells of discoidal and subcostal areas subopaque, rounded, abruptly much smaller than cells on apical half of hemelytron. Paranotum narrow, its cells elongate, no wider than outer limiting vein *sigillata*
- Cells of discoidal areas hyaline, similar to or only slightly smaller than cells in apical half of hemelytron. Paranotum wide, its cells rectangular to transverse, larger ones about 3× as wide as outer limiting vein *spinicosta*
- 4. Midline of head with a very long (almost as long as antennal segment I), tapering, subvertical spine between eyes. Paranotum at level of calli vertically reflexed, bringing marginal spines to a vertical or inflexed position *dira*
- Midline of head without a long spine, sometimes with a short, conical tubercle. Paranotum and marginal spines not reflexed, directed obliquely outward 5
- 5. Basal seventh of costal margin with 1–3 short, oblique spines *thaumana*
- Costal margin with no spines 6
- 6. Discoidal area open apically, not closed by a slightly elevated vein connecting the parallel inner and outer limiting vein. All antennal segments, occipital spines, legs (except sometimes tarsi), veins of paranotum and basal two-thirds or more of costal vein wholly dull black *abducta*

- Discoidal area closed apically by a noticeably elevated cross vein connecting inner and outer limiting veins and forming acute angle with latter in a more-or-less prominent pale spot. Antennal segment III, occipital spines, legs, and veins of paranotum and costa in noticeable part yellow to hyaline *armigera*

Genus *Carvalhotingis*, NEW GENUS
(Figs. 2, 4)

Diagnosis.—As defined and keyed above.

Characters.—Length 2.8–3.8 mm. Dorsal surface and appendages with many long, pale, erect or recumbent hairs. Hemelytral axes virtually parallel, apices slightly separated.

Head.—Short, without cephalic spines (often with matted groups of decurved hairs resembling spines). Eye one-third to one-half as wide as interocular width. Bucculae parallel, not attaining apex of clypeus. Labium almost reaching or surpassing mesometasternal suture. Antenna slender, segment I two-thirds to fully as long as interocular width, about twice as long as II. Subantennal plate with anterior margin vertical, not approaching margin of clypeus (Fig. 4).

Pronotum.—Anteromedian cyst, when present, confined to area anterior to calli. Median carina simple or slightly elevated with a single row of small, obscure cells. Lateral carinae absent or only vaguely indicated on posterior projection. Paranotum no wider than an eye, narrowing posteriorly, uniseriate, lateral margin with a single row of 7–10 long, stout, tapering spines. Posterior projection of pronotum reaching basal third or midlength of discoidal area, acutely triangular, apex sharp or roundly truncated.

Hemelytron.—With or without a discal elevation. Discoidal area reaching nearly or quite to midlength of hemelytron, 2–4 cells wide, inner limiting vein scarcely or not at all elevated. Subcostal area distinctly oblique, 3–4 cells wide, outermost row of cells punctiform and set off by thickened vein. Costal margins concavely constricted along basal twelfth, thence gently convex; marginal row of long, tapering spines and

interspersed hairs extending well beyond apex of discoidal area. Costal area (beyond basal constriction) with 1–2 rows of cells along discoidal area, 2 rows beyond. Hypocosta uniseriate near base, becoming evanescent near midlength of abdomen.

Peritreme weakly to distinctly elevated. Metapleural flange very narrowly expanded, with or without a row of cells. Sternal laminae present on all 3 sterna, low: on mesosternum close together near base, thence well separated and parallel or converging; on metasternum broadly to narrowly cordate, apices variously separated. Abdomen convex basoventrally.

Type species.—*Acanthocheila tumida* Drake, here designated.

Known geographic range.—Central and South America from Mexico to Argentina.

Comments.—This genus is named in honor of Dr. José C. M. Carvalho, of Rio de Janeiro, Brazil.

Examination of the five cataloged taxa that run to the first half of couplet 4 in the key below [*comitis* Drake, *denier* Monte, *hollandi* Drake, *rustica rustica* Monte, and *rustica plana* Drake] failed to find constant fundamental characters for their separation, and this coupled with the variation exhibited in a series of 28 specimens labeled “Vicososa, Brazil, Minas Geraes, 23-5-34, E. H. Hambleton” associated with a code number “111” leaves no alternative to synonymizing all of them. In that series of 28 specimens, the basal fourth of the expanded costal area may be wholly uniseriate, may have one to several extra interspersed individual cells on one side (as in holotype of *Acanthocheila rustica plana*) or on both sides or a second partial row; occasionally an extra cell may be found in the costal area near the apical fourth of the discoidal area.

LIST OF *CARVALHOTINGIS* Species

Carvalhotingis comitis (Drake). NEW COMBINATION.

Acanthocheila comitis Drake, 1948: 23.
Known distribution: Mexico, Guatemala.

Carvalhotingis hollandi (Drake). NEW COMBINATION.

Acanthocheila hollandi Drake, 1935: 16.

Acanthocheila denieri Monte, 1940: 287.

NEW SYNONYMY.

Acanthocheila rustica Monte, 1942: 91.

NEW SYNONYMY.

Acanthocheila comentis Drake, 1953: 13.

NEW SYNONYMY.

Acanthocheila rustica plana Drake, 1953: 13. NEW SYNONYMY.

Known distribution: Argentina, Brazil, Paraguay.

Carvalhotingis nexa (Drake). NEW COMBINATION.

Acanthocheila nexa Drake, 1936: 701.

Known distribution: Argentina, Brazil.

Carvalhotingis tumida (Drake). NEW COMBINATION.

Acanthocheila tumida Drake, 1924: 94.

Known distribution: Bolivia, Brazil.

Carvalhotingis visenda (Drake and Hambleton). NEW COMBINATION.

Acanthocheila visenda Drake and Hambleton, 1934: 442.

Known distribution: Argentina, Brazil, Peru.

KEY TO *CARVALHOTINGIS* SPECIES

(ignore outer row of punctiform cells in subcosta)

- 1. Discal elevation of hemelytron strongly inflated, inflation laterally rising almost or quite vertically from inner limiting vein of costal area. Collar medially with distinctly elevated, inflated cyst usually as high as or higher than interhumeral convexity 2
- Discal elevation of hemelytron not or scarcely inflated, laterally rising obliquely from inner limiting vein of costal area. Collar sometimes visibly tectate but not inflated, distinctly lower than interhumeral convexity 3
- 2. Costal area in basal third or more with a single row of large, rectangular cells *nexa*
- Costal area with 2 irregular rows of cells to base *visenda*
- 3. Subcostal area along basal half or more of discoidal area coriaceous with punctiform cells, thence (ignore outer row of punctiform cells) abruptly with large hyaline cells *tumida*

- Subcostal area along basal third or fourth of discoidal area with punctiform cells, thence (ignore outer row of punctiform cells), on apical two-thirds, cells gradually enlarging 4
- 4. Dorsal outline of discal elevation, in lateral view, a low, convexity *hollandi*
- Dorsal outline of discal elevation, in lateral view, a blackened, abrupt, erect, tabular projection *comitis*

ACKNOWLEDGMENTS

The author is grateful for the special support he received from the National Science Foundation in the form of a grant (NSF-GB-791) to study Tingidae and other Heteroptera in European Museums in 1968; this grant plus the kind cooperation of Dr. L. Brundin made possible study of Stål's types in the Riksmuseet, Stockholm. For preparation of this paper, special acknowledgment goes to Y. T. Sohn (Illustrator, Dept. Entomol., Smithsonian Inst., Washington, D.C.) for the excellent illustrations; and to J. E. McPherson (Dept. Entomol., Southern Illinois University, Carbondale), R. M. Smith (Texas A&M University, College Station), P. J. Spangler (Dept. Entomol., Smithsonian Inst., Washington, D.C.), and A. G. Wheeler, Jr. (Pennsylvania Department of Agriculture, Harrisburg) for helpful reviews of the manuscript.

LITERATURE CITED

Champion, G. C. 1897. Insecta: Rhynchota (Hemiptera-Heteroptera). In Godman and Selvin. *Biologia Centrali-Americana*. London. 2:1-32.

Drake, C. J. 1924. A new species of *Acanthocheila* from Bolivia (Hemiptera-Tingitidae). *Bulletin of the Brooklyn Entomological Society* 19: 94.

———. 1935. American Tingitoidea (Hemiptera) in the Natural History Museum of Vienna. *Sondar-Abdruck aus "Konowia"* 14: 9-20.

———. 1936. Some Tingitoidea from Argentina (Hemiptera). *Travaux de l'Institut Zoologique de l'Académie des Sciences de l'URSS* 3: 699-701.

———. 1948. New American Tingidae (Hemiptera). *Boletín de Entomología Venezolana* 7: 20-25.

———. 1953. New Neogaean Tingidae (Hemiptera). *Great Basin Naturalist* 13: 13-16.

Drake, C. J. and G. Bondar. 1932. Concerning Brazilian Tingitidae, Hemiptera. *Boletim do Museu Nacional, Rio de Janeiro* 8: 87-96, 1 plate.

- Drake, C. J. and S. C. Bruner. 1924. Concerning some Tingitidae occurring in the West Indies (Hemip.). *Memorias de la Sociedad Cubana de Historia Natural "Felipe Poey"* 6: 1-13.
- Drake, C. J. and R. H. Cobben. 1960. The Heteroptera of the Netherlands Antilles—V, Tingidae (lace bugs). *Studies on the Fauna of Curaçao and Other Caribbean Islands* 10:(54): 67-97.
- Drake, C. J. and E. J. Hambleton. 1934. Brazilian Tingitidae (Hemiptera). Part I. *Revista de Entomologia, Rio de Janeiro* 4: 435-451.
- . 1945. Concerning Neotropical Tingitidae (Hemiptera). *Journal of the Washington Academy of Sciences* 35: 356-367.
- Drake, C. J. and F. A. Ruhoff. 1965. Lacebugs of the world, a catalog (Hemiptera: Tingidae). *United States National Museum Bulletin* 243: i-vii, 1-634, frontispiece, plates 1-56.
- Kirkaldy, G. W. 1905. Quelques tingides nouveaux ou peu connus [Hem.]. *Bulletin Société Entomologique de France* 15: 216-217.
- Monte, O. 1938. Tingitídeos Neotrópicos. *Boletim Biologico, new series* 3: 127-132.
- . 1940. Tingitídeos novos ou pouco conhecidos da Fauna Americana. *Arquivos de Zoologia do Estado de Sao Paulo* 11: 283-300.
- . 1942. Apontamentos sôbre Tingitídeos (Hemiptera) Americanos, especialmente do Brasil. *Arquivos do Instituto Biologico Sao Paulo*, 13: 91-98.
- Stål, C. 1858. Bidrag til Rio Janeiro-Traktens Hemiptera-fauna. I. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 2(7): 1-84.
- . 1872-1873. *Enumeratio Hemipterorum: Bidrag till en foreteckning ofver alla hittills kända Hemiptera, jemte systematiska meddelanden. Kongliga Svenska Vetenskaps-Akademiens Handlingar*, 1872, Part 2, 10(4): 1-159; 1873, Part, 11(2): 1-163.
- Uhler, P. R. 1889. Observations upon the Heteroptera collected in southern Florida by Mr. E. A. Schwarz. *Proceedings of the Entomological Society of Washington* 1: 142-144.
- Van Duzec, E. P. 1907. Notes on some Jamaican Hemiptera, a report on a collection of Hemiptera made on the island of Jamaica in the spring of 1906. *Bulletin of the Buffalo Society of Natural Sciences* 8(5): 3-79.
- . 1916. Check List of the Hemiptera (Excepting the Aphididae, Aleurodidae and Coccidae) of America North of Mexico. *New York Entomological Society, New York*. xi + 2 + 111 pp.
- White, F. B. 1879. Descriptions of New Hemiptera (I). *Journal of the Linnaean Society of London, Zoology* 14: 482-489.